

ABSTRACT

**5 METHODS AND APPARATUS FOR SELF-OPTIMIZATION OF
 ELECTROSPRAY IONIZATION DEVICES**

 An automated electrospray ionization (ESI) device and related methods to optimize
10 electrospray interface conditions for mass spectrometric analysis. The optimization process
 can be performed with calibration or optimization solutions that produce expected ESI
 parameters such as an ESI signal or an ion current. The ESI device may include an
 input/output (I/O) controller that is coupled to an electrospray assembly including an XYZ
 stage for positioning an electrospray emitter relative to a mass spectrometer orifice. The
15 I/O controller may be connected to a power supply for applying an adjustable electrospray
 ionization voltage, and an adjustable flow regulator that alters the flow of solution by
 modifying applied voltage and/or pressure. A central processing unit instructs the I/O
 controller to control selectively the electrospray assembly based on the resultant signals
 from the mass spectrometer or the ion currents within the mass spectrometer in accordance
20 with a predetermined optimization algorithm. The resulting ESI signal or ion currents are
 monitored and provide feedback to the I/O controller which can automatically instruct
 selected system components to make adjustments as needed to attain optimal settings that
 produce expected ESI signals or ion currents in the mass spectrometer for selected
 solutions.